IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re:	Korn, et al.		
Serial No:	09/707,710	Group:	2882
Filed:	11/7/2000	Examiner:	Wang, George
For:	System and Process for Post Alignment Polarization Extinction Ratio Compensation in Semiconductor Laser System	Confirmation No:	9810

#13/Appeal Brief mailed 7/18/03

Date: July 1, 2003

APPEALANTS' BRIEF

Mail Stop Appeal Brief- Patents
Assistant Commissioner for Patents
P.O. Box 1450,
Alexandria, Virginia 22313-1450

Sir:

This is the Applicants' appeal from the final Office Action, mailed October 2, 2002 (Paper No. 9).

A two-month extension of time is requested for this response.

Real Party of Interest

Axsun Technologies, Inc. is the real party in interest.

Related Appeals and Interferences

There are no related appeals or interferences.

Status of Claims

Claims 6-19 are pending in this application. Claims 6-19 stand finally rejected pursuant to the outstanding Office Action.

Please note that the Office Action Summary Page of the pending Office Action indicates that claims 1-5 are pending, but withdrawn from consideration. In fact, claims

1-5 were cancelled in the AMENDMENT UNDER RULE 111, which was filed on September 18, 2002. See specifically page 5 of that amendment.

Status of Amendments

All amendments have been entered. There were no post final amendments or proposed amendments.

Summary of the Invention

The present invention is directed to a method for controlling a polarization extinction ratio of a semiconductor laser system. The polarization extinction ratio is a measure of the polarization of light. Highly polarized light is important to the proper functioning of many optical systems.

The light emitted from semiconductor lasers is typically highly polarized. Polarization-maintaining fiber is used to transmit the polarized light to the optical system. In order to ensure that the light reaches the optical system in its polarized state, the polarization maintaining fiber must be rotationally aligned to the semiconductor laser. Specifically, the polarization maintaining fiber works by transmitting light along either a fast or slow axis, which axes extend in a plane that is perpendicular to the longitudinal axis of the fiber. The high polarization extinction ratio is achieved by aligning one of these axes to the polarization of the light emitted from the semiconductor laser.

In the past, this alignment was achieved by detecting the polarization extinction ratio of the light emitted from the polarization maintaining fiber, and then rotationally aligning the fiber endface to the laser until the polarization extinction ratio was maximized. The fiber endface was then soldered relative to the semiconductor laser.

The problem with this approach was that the process of securing the fiber endface in proximity to the semiconductor laser yielded: 1) slight shifts in the rotational position of the fiber endface and 2) mechanical stresses on the fiber that affected the polarization axes. These effects were due to the shifts that occur when the solder cools.

The present claimed invention seeks to solve this problem by first securing the fiber endface in proximity to the semiconductor laser. After it is secured, it is rotationally aligned relative to the laser, in order to optimize the polarization extinction ratio. In the preferred embodiment, this is achieved by plastically deforming the alignment structure, which is used to hold the fiber endface in proximity to the semiconductor laser.

In short, the present invention is directed to first securing the fiber endface and then rotationally aligning the endface to achieve the desired polarization. Thus, shifts occurring during the step of securing the endface can be corrected.

Issues

1. Whether claims 6-8, 10, 12, 13, and 16-19 are anticipated by U.S. Pat. No. 4,673,244 to Miles (hereinafter Miles Patent).
2. Whether claims 9, 11, 14, and 15 are unpatentable or obvious over the Miles Patent, in view of U.S. Pat. No. 6,345,059 to Flanders (hereinafter Flanders Patent).

Grouping of Claims

Claims 6-8, 10, 12, 13, and 16-19 stand or fall together. Claims 9 and 11 stand or fall together. Claims 14 and 15 stand or fall together.

Argument

Claim 6 is not anticipated by the Miles Patent.

Specifically, Claim 6 requires "securing an endface of the optical fiber to the package to receive light generated by the semiconductor chip", in combination with "after the step of securing the endface, detecting a polarization extinction ratio of light transmitted through the fiber from the semiconductor chip, and axially rotating the endface of the fiber to improve a polarization extinction ratio". That is, the endface is first secured, then the polarization extinction ratio is detected and the endface rotated to obtain the desired polarization extinction ratio.

In contradistinction, the Miles Patent teaches the conventional system, whereby the fiber endface is first aligned and then secured. Specifically, the Miles Patent,

beginning at Col. 3, line 57, describes an initial rough alignment, followed by a fine alignment, see description beginning at Col. 4, line 22. Then, as described in Col. 5, beginning at line 21, once the desired extinction ratio is achieved "[a]ll that remains is to attach the fiber to the laser."

Thus, Applicants believe that there can be no anticipation.

The arguments of the final Office Action do not seem to be based on a fair interpretation of the Miles Patent. For example, page 5 of the final Office Action states that "[i]t is after this preliminary alignment process of inserting and securing the fiber that PER detection begins (Col. 4, lines 19-21) and appropriate axial adjustments of the fiber to improve PER actually progress (Col. 4, lines 22-63)." This interpretation conflicts with the Miles Patent at Col. 5, lines 24-26, were it states that: [o]nce alignment is completed, ferrule 110 is bonded to submount platform 140...". Therefore, Applicants respectfully believe that the Examiner has misinterpreted the reference.

Applicants further believe that claims 9 and 14 are neither shown nor suggested by the applied references.

Claim 9 required that the aligning step comprises "plastically deforming a mounting structure to which the optical fiber is secured". Similarly, claim 14 specifies that the axial rotation of the endface comprises plastically deforming the mounting structure that secures the optical fiber to the package.

The Miles Patent does not show or suggest using deformable alignment structures to achieve alignment. The Flanders Patent, however, shows such alignment structures. See specifically, structure 114, for example, in Fig. 7. The alignment structures in the Flanders Patent, however, are used for x and y axis alignment. See Fig. 7 of the Flanders Patent. Polarization extinction is not addressed.

The pending Office Action asserts that Col. 4, lines 41-44, of the Flanders Patent discloses "[a] deforming structure [that] allows fibers that are already aligned and secured to be readjusted so that PER can be enhanced until a desired ratio level is reached (Col. 4,

lines 41-44)." The cited section of the Flanders Patent does not even mention polarization.

Thus, Applicants respectfully believe that the references have been misunderstood. And, for these further reasons, Applicants believe that the present rejections are in error, and should be withdrawn.

For the foregoing reasons, Applicants believe that the pending rejections should be withdrawn, and that the present application should be passed to issue. Should any questions arise, please contact the undersigned.

Respectfully submitted,

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Appendix

1. (cancelled)

2. (cancelled)

3. (cancelled)

4. (cancelled)

5. (cancelled)

6. A process for manufacturing a semiconductor laser system, the process comprising:

installing a semiconductor chip in a package;

inserting a polarization-maintaining optical fiber through a fiber feedthrough into the package;

securing an endface of the optical fiber to the package to receive light generated by the semiconductor chip;

after the step of securing the endface, detecting a polarization extinction ratio of light transmitted through the fiber from the semiconductor chip; and

axially rotating the endface of the fiber to improve the polarization extinction ratio.

7. A process as claimed in claim 6, further comprising aligning the endface to the semiconductor chip.

8. A process as claimed in claim 7, wherein the step of aligning the endface to the semiconductor chip comprises energizing the semiconductor chip and monitoring a magnitude of light coupled into the optical fiber.

9. A process as claimed in claim 8, wherein the endface is secured to the package prior to the aligning step, the aligning step comprising plastically deforming a mounting structure to which the optical fiber is secured.

10. A process as claimed in claim 8, wherein the endface is secured after the aligning step.

11. A process as claimed in claim 7, wherein the step of aligning the endface to the semiconductor chip comprises

energizing the semiconductor chip and monitoring a magnitude of light coupled into the optical fiber; and

positioning the endface relative to the semiconductor chip to maximize the magnitude of the light coupled into the optical fiber.

12. A process as claimed in claim 6, further comprising securing the fiber in a ferrule surrounding the fiber in the feedthrough.

13. A process as claimed in claim 6, wherein the step of detecting the polarization extinction ratio of light transmitted through the fiber comprises detecting a magnitude of light transmitted along a slow axis of the polarization-maintaining optical fiber and detecting a magnitude of light transmitted along a fast axis of the polarization-maintaining optical fiber, from the semiconductor chip.

14. A process as claimed in claim 6, wherein the step of axially rotating the endface of the fiber comprises plastically deforming a mounting structure that secures the optical fiber to the package.

15. A process as claimed in claim 6, wherein the step of axially rotating the endface of the fiber comprises:

deforming a mounting structure that secures the optical fiber to the package until a desired polarization extinction ratio is detected; and then

further deforming the mounting structure such that when released, the mounting structure will hold the fiber in an orientation corresponding to the desired polarization extinction ratio.

16. (amended) A process as claimed in claim 6, wherein the step of securing the endface of the optical fiber to the package comprises bonding the optical fiber to a mounting structure.

17. A process as claimed in claim 16, further comprising sealing around the fiber in the feedthrough.

18. A process as claimed in claim 17, wherein the step of sealing around the fiber is performed before the step of axially rotating the endface of the fiber to improve the polarization extinction ratio.

19. A process as claimed in claim 17, wherein the step of sealing around the fiber is performed after the step of axially rotating the endface of the fiber to improve the polarization extinction ratio.